



Call for Applications

Funded PhD in Geography and Research Assistant Positions

The Graduate School of Geography at Clark University invites applications to its PhD program and offers **two** Research Assistant (RA) positions for a NASA-funded project on “**Irrigation as climate-change adaptation in the Cerrado biome of Brazil**”, starting in August 2023. The PhD students working on this research project will develop expertise across a broad spectrum of the discipline of geography, including GIS, remote sensing, and political ecology / human-environment geography.

Interested candidates should contact Dr. Robert Gil Pontius (rpontius@clarku.edu) and Dr. Gustavo Oliveira (oliveira@clarku.edu). **The application deadline is December 15, 2022.**

The PhD students will be guaranteed eight semesters of stipend support, assuming acceptable progress in the doctoral program. In addition, the project RAs will receive two years of summer funding for fieldwork in Brazil. Clark University graduate student stipends are stipulated in collective bargaining agreements with the graduate student workers labor union and include 100% healthcare coverage. The nine-month stipend in 2023–2024 will be \$28,852, with scheduled annual increases thereafter. Clark University graduate students also enjoy a strong and close-knit community at the Graduate School of Geography, Clark University, and the city of Worcester, MA.

Candidates should apply to these RA positions via the general doctoral admission process, and note their interest in this RA opportunity at the beginning of their personal statement.

More information about the research project, Clark University’s Graduate School of Geography, and application to the PhD program are provided below.

PhD program application requirements:

- Personal statement
- CV/resume
- Three letters of recommendation
- Academic transcripts
- TOEFL/IELTS scores (if applicable)
- Application fee

More information about the PhD program and admissions requirements is available here:

<https://www.clarku.edu/departments/geography/graduate-programs/doctoral-programs/>

Requirements for the RA positions:

- Bachelor degree in geography or closely related discipline, with preference for candidates with a Master degree in geography
- Proficiency in both English and Portuguese



- A minimum TOEFL score of 100 or IELTS score of 7 is required for international candidates from non-English speaking countries
- International candidates from a non-English speaking country who are currently studying at the university level in an English-speaking country or who earned a university degree in one of these countries within the last ten years may request a waiver of the TOEFL/IELTS requirement
- For candidates from non-Portuguese speaking countries, a Zoom interview will be conducted to assess proficiency in Portuguese language
- Ability to undertake and communicate high-quality scientific research (demonstrated by publication of a thesis, journal articles, etc.)
- Ability to spend summers undertaking fieldwork in Brazil
- Ability to work collaborative with an interdisciplinary team
- Experience with GIS/remote sensing OR qualitative research methods in human-environment/agrarian geography
 - PhD student RAs who come with a stronger background in GIS/remote sensing will be asked to develop experience with qualitative research methods and vice versa

About Clark University's Graduate School of Geography:

Established in 1921, the Graduate School of Geography at Clark is internationally renowned for innovative scholarship and is an acknowledged leader in the field. Consistently ranked as one of the Top 10 graduate programs by the National Research Council, Clark Geography enables graduate students to train with top professionals and participate in a world-class research community. Students are guaranteed tuition remission and graduate assistantships for a minimum of the first four years, fostering a tight-knit, supportive intellectual community. Having awarded more PhDs than any other geography program in the US, Clark Geography has a reputation for training future leaders in the field.

About the Research Project:

Irrigation as climate-change adaptation in the Cerrado biome of Brazil

We will (1) examine the expansion of irrigated agriculture as a form of adaptation to climate change in the Cerrado biome region of Bahia state, Brazil; (2) develop methods with software to quantify and analyze land change and its associated socio-economic drivers and impacts; and (3) develop spatially explicit scenario models that inform policy concerning agrarian development, water regulations, and climate change adaptations.

The Brazilian Cerrado is one of the most important and threatened ecosystems in the world in terms of carbon fluxes, water resources, biodiversity, and social diversity including indigenous and other traditional communities. Agricultural expansion has become central to the Cerrado's regional development and global food security. The Cerrado's northeastern region in western Bahia state of Brazil is one of the most active agricultural frontiers worldwide. Expansion of irrigation is the primary form of climate change adaptation in the region, where rainfall has decreased by 12% since 1980, causing substantial reductions in the Urucuia aquifer and river discharge. Climate change has already pushed 28% of current agricultural lands in the Cerrado out of their optimum climate space.



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This combination of reduced availability and increased demand for water resources is already triggering socio-environmental conflicts and pushing governance of water resources to the top of policy agendas.

The social science component of the research will (1) examine political-economic data concerning land ownership, agricultural production, irrigation, and related policies; (2) political-ecological data concerning water resources, land cover land use change (LCLUC), and socio-economic drivers and impacts of irrigation; and (3) undertake fieldwork to validate new remote sensing methods to detect various forms of irrigation, and conduct interviews with government officials, farmers, and community members on the effectiveness of irrigation as climate change adaptation, its social and ecological drivers and impacts, and alternative adaptation strategies.

The GIS component will create novel methods to characterize the gross changes in terms of an interpretable number of components. This will enable us to move beyond traditional methods that show a trend line that gives the size of a land category as a function of time, indicating net change but neither gross gain nor gross loss. This will also enable us to move beyond traditional approaches that compute a table that shows how each land category transitions to every other land category during each time interval, but become overwhelming to interpret across multiple time intervals. We will test whether our new methods allow researchers to distinguish phases when the processes are stable versus phase changes, such as when the government modifies irrigation and land-use policies.

We will then develop scenarios to model future LCLUC. We will compare baseline scenarios of continuation of recent trends to other scenarios characterized by various irrigation management policies and strong / weak climate change. The combination of scenarios will generate empirically-based evaluations of multiple policy proposals for climate change adaptation.

Our Brazilian institutional collaborator is MapBiomass, which is a network of universities, technology companies, and non-governmental organizations (<https://mapbiomas.org/>).